

NMS Ionising Radiation Metrology Programme 2004-2007

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Background to the NMS

- The Department of Trade and Industry is responsible for the National Measurement System (NMS)
- The aim of the NMS is to provide world-class, internationally accepted, measurement standards for the UK
- These measurement standards enable compliance with legislation, improve the quality of life and bring economic benefit



How the programme was devised

- Long term 'Trend Spotting Forward Look' by PA Consulting
- Consultation with stakeholders including the nuclear industry, regulators, hospitals, universities, government and other national measurement laboratories
- Reviewed and prioritised by a peer review committee (the MAC-WG)



Overview of project structure

International comparisons



R&D for primary standards



Secondary standards / transfer instruments



Measurement services / Forums / Advice / Articles

Nuclear industry

Radiation protection



Waste and
decommissioning

Environmental
monitoring

Healthcare

Radiotherapy

Brachytherapy

Nuclear medicine



Radioimmunotherapy

Diagnostic x-rays

Proton radiotherapy

'Non-nuclear' industry



Cosmic-ray dosimetry



Naturally occurring
radioactive materials

Radon

- Theme 3: Neutron Standards
- Highlights from Radioactivity and Dosimetry Themes

Radionuclide based neutron standards

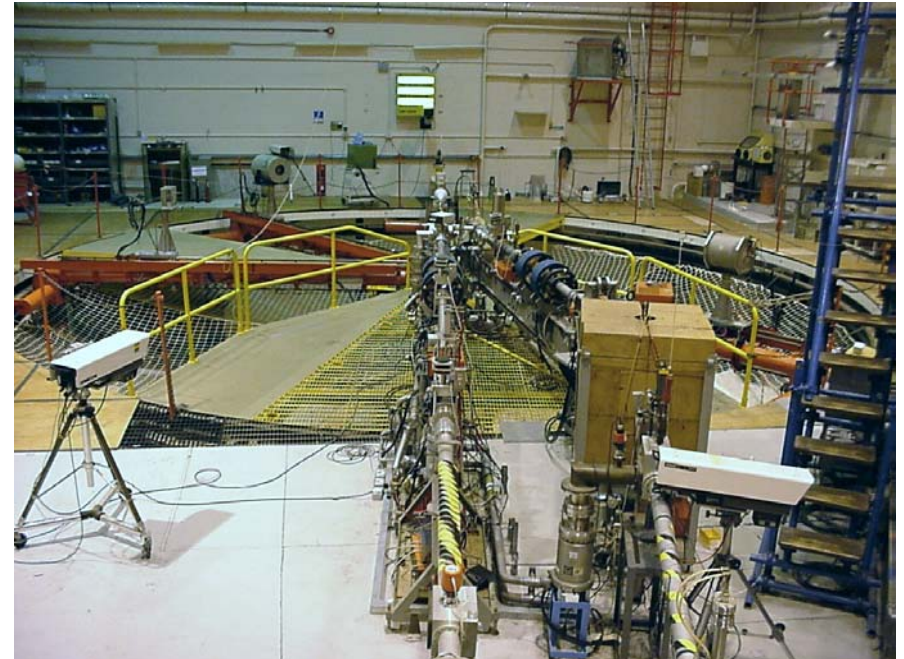


Standard radionuclide neutron sources

- Used for instrument calibrations
- Upgrading Mn-56 bath
- Improvements to source & detector mounting arrangements
- New Cf-252 source

Accelerator based standards

- Used to determine instrument characteristics
- Improvements to targets
- Production of high energy neutrons (>15 MeV)
- Characterisation of the neutron field using time of flight system
- Characterisation of thermal field (for dose equivalent quantities and contaminant photons)
- Maintenance of the facilities



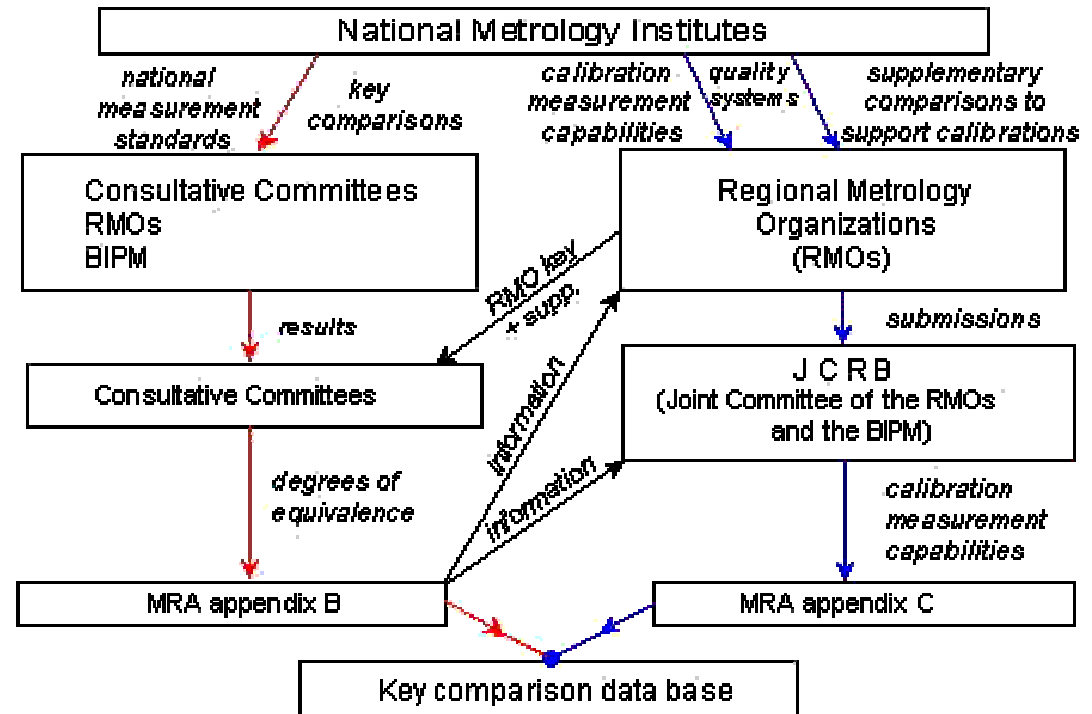


Bonner spheres

- Improved response function data for Bonner Spheres and use of digital signal processing
- Development of the TEPC
- Development of capability in mixed neutron – gamma fields

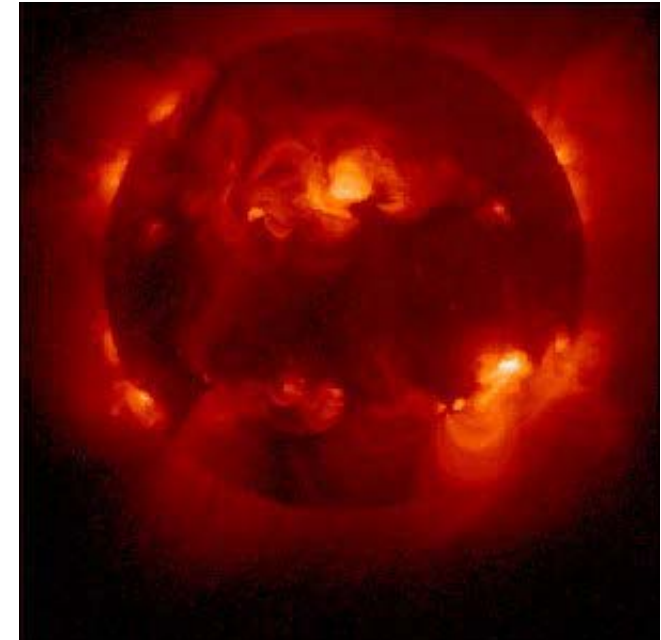
Equivalence to international standards

- Participation in international comparisons
- Maintenance of quality system
- Participation in BIPM committees



Flare watch

- Air crew face the greatest occupational exposure to radiation (cosmic rays)
- Solar flares might result in high dose-rates (up to 50 mSV/h) but there are no experimental data
- Airlines may need to take drastic action if dose rates increase (reduce altitude, ground flights....)
- This project aims to keep a TEPC detector in the air at all times to produce data to enable airlines to decide the best course of action

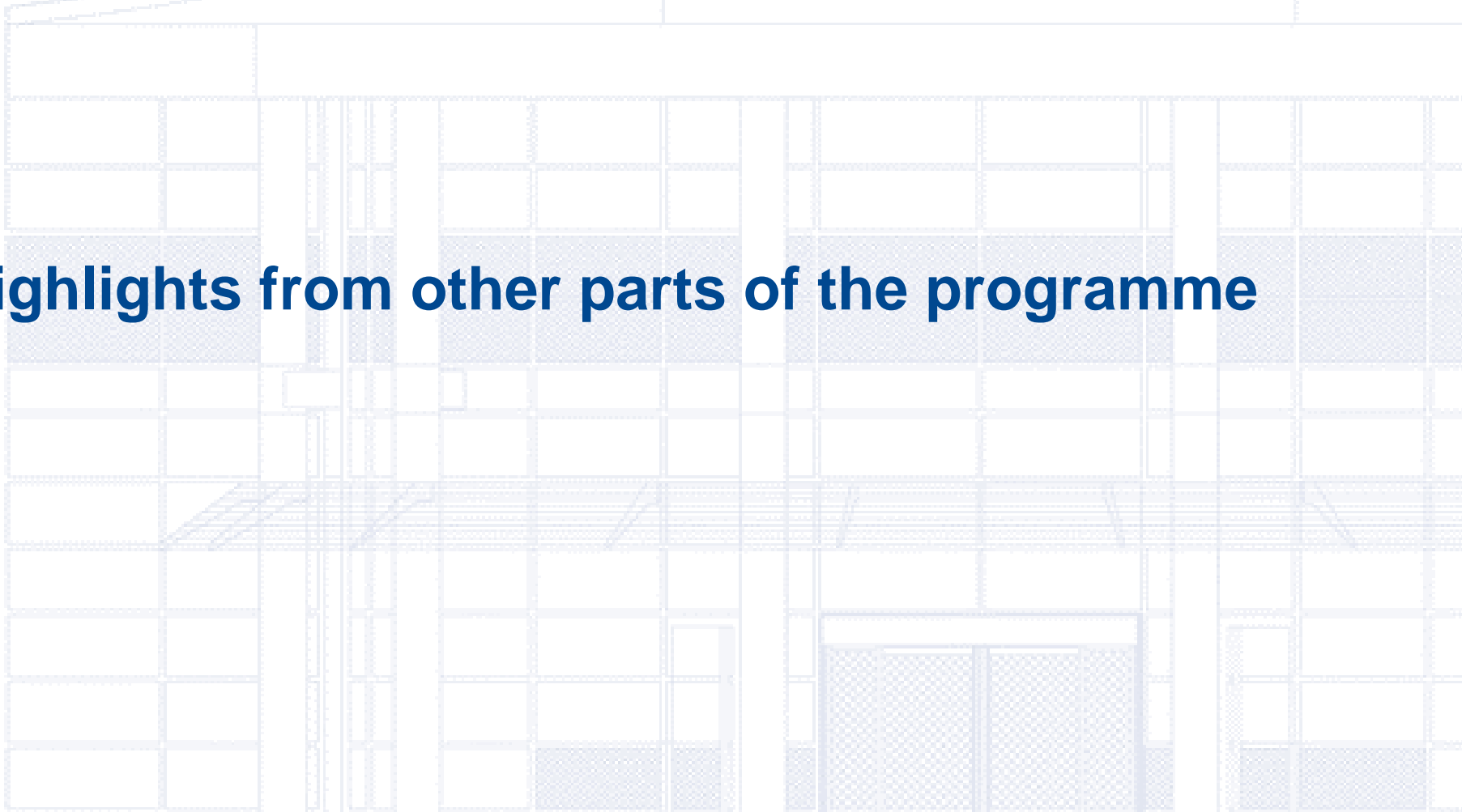


Knowledge transfer

- User Forums
- Training
- Good Practice Guides
- Publications
- Consultancy
- Laboratory proficiency testing exercises

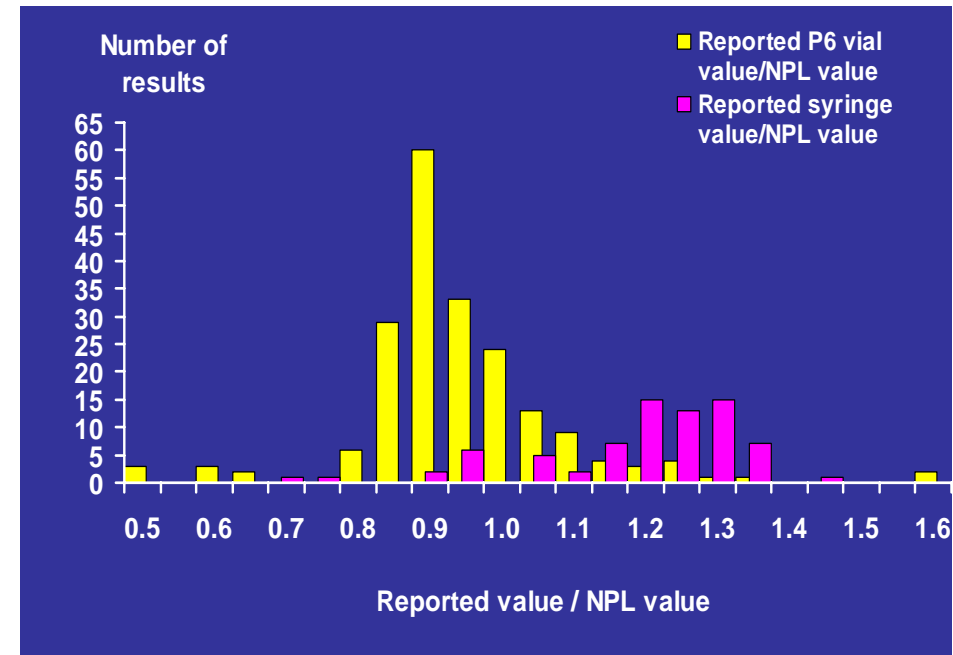


Highlights from other parts of the programme



Nuclear Medicine

- Increase in nuclear medicine provision – new technologies, new radionuclides.
- Increasing regulation from drug development to administration.
- Projects working with hospitals will:
 - Set up a traceability scheme for PET radionuclides
 - GPG for NM
 - Establish technical audit scheme for nuclear medicine departments



Dosimetry

- New conformal radiotherapy techniques offer improved cancer treatment. Radiation beam is tailored to size and shape of tumour (e.g. IMRT)
- Project will:
 - Work with hospitals and IPEM on dosimetry of small fields (including developing Code of Practice)
 - Work with university on 3D dosimetry systems
 - Work with hospitals to develop traceability and consistency for proton radiotherapy



Decommissioning

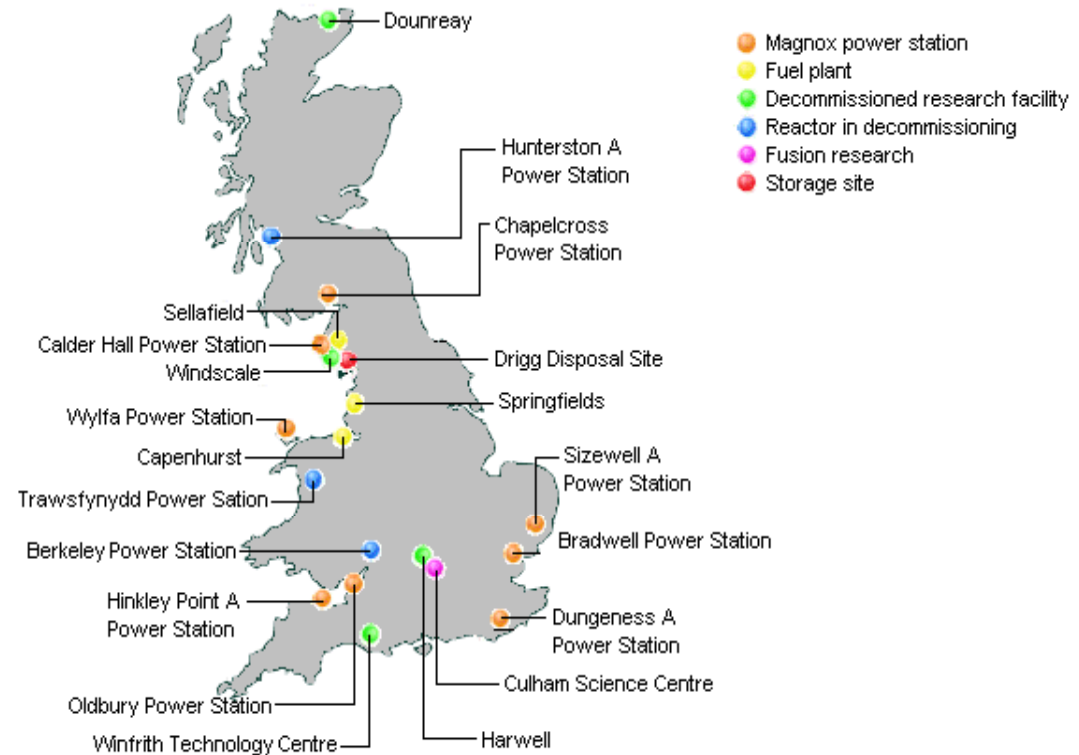
“Nuclear clean up is one of the most important technical and environmental challenges facing the UK. We need to ensure that the nuclear legacy is cleaned up in ways which protect the environment for the benefit of current and future generations.”

Brian Wilson, Minister of State for Energy and Construction.

Decommissioning

Project will:

- Run workshop to define measurement needs
- Work with industry on measurement codes of practice
- Produce reference material (e.g. standard drum)



- The Ionising Radiation Programme is funded by the DTI to ensure ionising radiation measurements in the UK are accurate, consistent and accepted internationally
- Through this programme, NPL maintains primary standards and routes to disseminate use of these standards (including Good Practice Guides, Forums, Measurement Services...)
- A new project under this programme addresses the measurement infrastructure for radioactive waste